REMARKS

Claims 1-8 are pending in this application. Claim 9 has been canceled.

Double Patenting Rejection

Claim 9 has been rejected under 35 U.S.C § 101 as claiming the same invention as claim 18 of U.S. Patent No. 6,720,251. Applicants have canceled claim 9 to obviate the rejection.

Rejections Under 35 U.S.C § 103

Claims 1-4 and 6-8 are rejected under 35 U.S.C 103(a) as being obvious over US Patent No. 6,635,583 to Bencher et al. ("Bencher") in view of U.S. Patent No. 6,316,167 to Angelopoulos et al ("Angelopoulos"). Claim 5 is rejected as being obvious over Bencher in view of Angelopoulos and further in view of U.S. Patent No. 6,147,009 to Grill et al.

The cited patents have been considered and it is respectfully submitted that they do not prevent patenting of the claims at least because there is no motivation for one of skill in the art to combine Bencher with Angelopoulos.

The Examiner states that one of skill in the art would be motivated to modify the SiC antireflective layer in Bencher with the oxygenated SiC layer in Angelopoulos because Bencher teaches that desired properties for an ARL layer include low dielectric constant, minimization of undesired reflections, high etch selectivity with respect to typical low-k or damascene materials, and manufacturability. The Examiner contends that Angelopoulos teaches that an oxygenated SiC film has these properties.

Applicants submit that one of skill in the art would not be motivated to oxygenate the SiC films of Bencher because Bencher *teaches away* from oxygenated SiC films. Bencher teaches a silicon carbide film having significant amount of carbon-bonded silicon species and thus a minimum amount of oxygen.

For example, a FTIR spectrograph of a silicon carbide film produced by Bencher's preferred method of using an organosilane is shown in Figure 5 and described in col. 10, lines 43-55. The FTIR spectrograph of Figure 5 shows significant peaks corresponding to SiC, $Si(CH_2)_n$ and $SiCH_3$ bonds within the film sample. Bencher further compares Figure 5 with Figure 6, a FTIR spectrograph of a SiC film prepared using silane and methane, a less preferred method. When comparing the FTIR spectrographs of the film using the less preferred method (Figure 6) to the film using the preferred method (Figure 5), Bencher states,

"As can be seen, there is no corresponding peak for $Si(CH_2)_n$ and even the peak for $SiCH_3$ is not as noticeable. The SiC of the present invention has yielded these unexpected results in providing better ARC/barrier layer/etch stop performance than previous known depositions of SiC." (col. 10, lines 47-53)

Therefore, it can be inferred that Bencher prefers a film with more $Si(CH_2)_n$ and $SiCH_3$ bonds. To produce such a film, process conditions are such as to minimize the amount of oxygen atoms that can be introduced into the film since oxygen can also bond with silicon and reduce the amount of carbon-bonded silicon formed in the film. In fact, Bencher states that in preferred embodiments, "the reaction occurs without a substantial source of oxygen introduced into the reaction zone."(col. 10, lines 7-9)

At least because one of skill in the art would recognize that a film having 20%-80% oxygen as required by claims 1-8 would have a greatly reduced amount of carbon-bonded silicon, counter to Bencher's teaching, there is no motivation to combine the cited references.

Further, contrary to the Examiner's contention, nowhere does Angelopoulos teach or suggest that the oxygenated films have the properties Bencher describes as desirable for damascene or low-k materials. Angelopoulos fails to mention dual damascene devices and likewise, fails to mention damascene devices at all. Angelopoulos also fails to mention or suggest the use of an anti-reflective layer on low k dielectric materials. As far as desired optical properties, Bencher teaches that the preferred values of refractive index and absorption index at 248 nm exposure are 2.2 and between 0.3 – 1.0, respectively (col. 12, lines 54-64); these are values that Angelopoulos teaches are most closely obtained with *un-oxygenated* SiC (see, e.g. Si:C:H film with n of 2.261 and k of 0.323 in the Table in col. 10).

Indeed, as the Examiner states in the Office Action, Angelopoulos teaches that SiC and SiCO layers are interchangeable. Because Bencher discourages films containing significant

amounts of oxygen and Angelopoulos does not teach or suggest an advantage to using SiCO films instead of SiC, it is respectfully submitted that the one of skill in the art would not be motivated to modify Bencher in the manner the Examiner suggests.

Thus, for at least the reasons given above, claims 1-8 are patentable over the cited art. Withdrawal of these rejections under 35 U.S.C. 103(a) is therefore respectfully requested.

Conclusion:

In light of the foregoing amendments and remarks, Applicants respectfully submit that all pending claims are now in condition for allowance. Thus, Applicants respectfully request a Notice of Allowance from the Examiner. Should any unresolved issues remain, the Examiner is encouraged to contact the undersigned at the telephone number provided below. No fees appear to be necessary for this Amendment. However, if the Commissioner determines that any fee is due, such fee may be charged to deposit account No. 50-0388 (Order No. NOVLP037C1).

Respectfully submitted,
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